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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/709,865	06/02/2004	Derren N. Dunn	FIS920030181US1	3864
23550	7590	06/26/2006	EXAMINER	
HOFFMAN WARNICK & D'ALESSANDRO, LLC			FOURSON III, GEORGE R	
75 STATE STREET			ART UNIT	
14TH FLOOR			PAPER NUMBER	
ALBANY, NY 12207			2823	

DATE MAILED: 06/26/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

<b>Office Action Summary</b>	<b>Application No.</b>		<b>Applicant(s)</b>	
	10/709,865		DUNN ET AL.	
	<b>Examiner</b>		<b>Art Unit</b>	
	George Fourson		2823	

**-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --**

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE \_\_\_\_ MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☐ Responsive to communication(s) filed on \_\_\_\_.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-20 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-20 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)  | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. ____. |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                                   | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)             |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date ____. | 6) <input type="checkbox"/> Other: ____.  |

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The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1-20 are rejected under 35 U.S.C. 103(a) as being unpatentable over the combination of Kim et al 2005/0095443 in view of either one of Koh et al 2004/0009307 and Kim et al 2005/0101132.

Kim et al '443 discloses a device formation method including providing a silicon dioxide layer on a Si substrate [0010], alternately exposing the substrate to TaCl<sub>5</sub> [0026] and a plasma composed of a mixture of hydrogen and nitrogen to form tantalum nitride (TaN) [0007]. The reference discloses that the nitrogen content of the films can be controlled by changing nitrogen partial pressure during the plasma step and formation of stoichiometric tantalum nitride [0007] and [0031]-[0033]. The reference discloses repeating the steps 40-250 times until a desired thickness is obtained [0011]. The reference discloses use of carrier gas [0028]. The reference discloses the effect of nitrogen content on resistivity of the film [0035]. The reference discloses "varying concentration of nitrogen plasma to thereby vary the amount of nitrogen in the layer" (claim 2). The reference does not disclose formation of tantalum nitride using a nitrogen plasma but instead discloses use of nitrogen and hydrogen plasma.

Kim et al '307 discloses formation of TaN including multiple exposure cycles of TaCl<sub>5</sub> and either a pure nitrogen plasma or a nitrogen hydrogen plasma to vary the composition of the TaN layer in each deposition cycle [0071].

It would have been obvious to one of ordinary skill in the art to employ the recited amounts of nitrogen in formation of the the recited number of protective and stoichiometric TaN layers in view of the disclosure of Kim et al '443 that the nitrogen content affects the resistivity of the TaN layer and the

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disclosure of Kim et al '307 that the range of hydrogen content in the plasma has a lower limit of zero in producing a TaN layer useful as a barrier layer and that the composition can be varied for each layer.


The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

See Koh et al 2005/0101132 [0069].

Any inquiry concerning this communication or earlier communications from the examiner should be directed to George Fourson whose telephone number is (571) 272-1860. The examiner can normally be reached on Monday through Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Matthew Smith, can be reached on (571) 272-1907. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

  
George Fourson  
Primary Examiner  
Art Unit 2823

GFourson  
June 20, 2006